
Valve Selection

1. Function and service considerations

Selection

Valves serve the purpose of controlling the fluids in building services piping. Valves are produced in a variety of design types and materials.

Proper selection is important to ensure the most efficient, cost-effective and long-lasting systems.

2. Function

Valves are designed to perform four principal functions:

1. Starting and stopping the flow
2. Regulating (throttling) the flow
3. Preventing reversal of the flow
4. Regulating or relieving the pressure of the flow

3. Service Considerations

1. Pressure
2. Temperature
3. Type of fluid
 - a) Liquid
 - b) Gas; i.e., steam or air
 - c) Dirty or abrasive (erosive)
 - d) Corrosive
4. Flow
 - a) On-off throttling
 - b) Need to prevent flow reversal
 - c) Concern for pressure drop
 - d) Velocity
5. Operating conditions
 - a) Condensation
 - b) Frequency of operation
 - c) Accessibility
 - d) Overall size/space available
 - e) Manual or automated control
 - f) Need for bubble-tight shut-off

Valve Design, Materials, and Approvals

1. Valve Design Choices

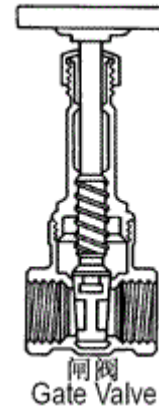
1. Multi-Turn
 - a) Gate
 - b) Globe/Angle-Globe
2. Quarter-Turn
 - a) Ball
 - b) Butterfly-resilient seated
3. Check (backflow prevention)
 - a) Swing
 - b) Lift
 - c) Spring-actuated
4. End connections

2. Materials

1. Bronze (up to 550°F at 150 psi/up to 600 psi at 150°F) 1/4"-3"
2. Cast Iron (up to 450°F at 250 psi/up to 500 psi at 100°F) 2"-24"
3. Ductile Iron (up to 650°F at 125 psi/up to 600 psi at 100°F) 2"-12"
4. Stainless Steel (up to 650°F at 125 psi/up to 2000 psi at 100°F) 1/4"-12"

Multi-Turn Valve Design Detail (1)

a) Gate Valves



Positive Features – Recommendations

- 1) Good choice for on-off service
- 2) Full flow-low pressure drop
- 3) Bidirectional

Disadvantages

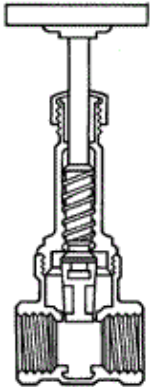
- 1) Not for throttling; use fully opened or fully closed
- 2) Metal-to-metal seating means not best choice for frequent operation. Bubble-tight seating should not be expected with metal-to-metal design.
- 3) Difficult to automate.

Wedge and Seat Designs

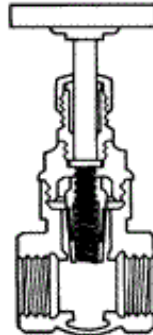


- 1) Solid wedge best choice for all building services. Modern foundry and machining controls enable the solid wedge to give good performance in a broad range of services.
- 2) Metal solid wedge seating against metal seat in body is the most common in building service piping. Rubber-coated solid wedge (resilient wedge) has become popular in fire protection and municipal cold water service. The resilient wedge design offers bubble-tight seating, but is limited to 160°F water service.

Stem Designs



Rising Stem-
Inside Screw
明杆内螺纹



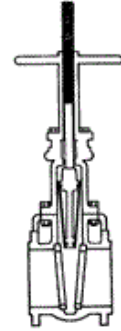
Non-Rising-Inside
Screw Stem
暗杆内螺纹阀杆

1) Rising stem-inside screw is the most common and preferred design for bronze multi-turn valves. In the fully open “back seated” position*, the stem threads are protected from the circulation of flow media. Because the stem rises as the valve is opened, clearance must be provided and stem orientation should protect it from external damage. The stem position indicates to the observer if the valve is opened or closed.

*Repacking while valve is pressurized is not recommended.

2) Non-rising-inside screw stems are used in bronze and Iron Gate valves. While they are more compact than rising stem valves, the stem threads are always exposed to flowing media, allowing for possible erosion/corrosion. Open/close indication is not provided with this design.

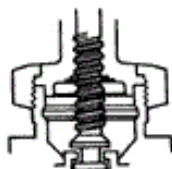
Multi-Turn Valve Design Detail (2)



Rising Stem-
Outside Screw
明杆外螺纹

3) Rising stem-outside screw and yoke is preferred in iron multi-turn valves. Threads are external to the valve, protecting them from flow media and enabling lubrication. Care should be taken for clearance as the stem rises so that threads are not damaged. The stem position provides indication that valve is opened or closed.

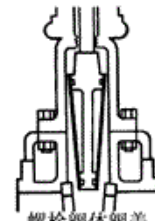
Body-Bonnet Connection



管接头式阀盖
Union Bonnet



螺纹旋进阀盖
Threaded-in Bonnet



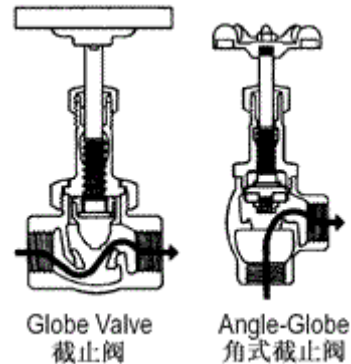
螺栓阀体阀盖
Bolted Body-Bonnet

1) Union bonnet is recommended as the best choice for building services piping for bronze multi-turn valves, although not all styles offer this design. The union bonnet offers strength and ease of assembly-disassembly.

2) Threaded-in bonnet is common in lighter-duty services and smaller sizes of bronze multi-turn valves.

3) Bolted body-bonnet connection is the principal design used in iron multi-turn valves. This gasket joint is strong and easy to assemble/disassemble.

b) Globe/Angle-Globe Valves



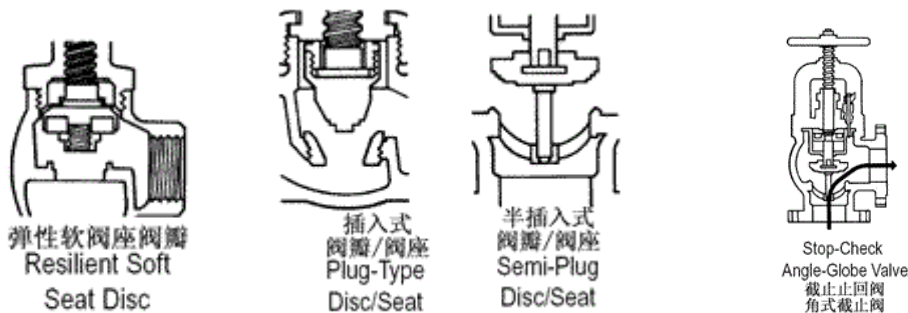
Positive Features – Recommendations

- 1) Recommended for throttling applications
- 2) Positive bubble-tight shutoff when equipped with resilient seating
- 3) Good for frequent operation

Disadvantages

- 1) Significant pressure drop due to flow path
- 2) More costly than alternate valves

Disc and Seat Designs



- 1) Resilient (soft) seat discs are preferred over metal to metal except where temperatures, very close throttling or abrasive flow make metal alloy seating a better choice. TFE is the best resilient disc material for most services, although rubber's softness gives good performance in cold water.
- 2) Plug-type disc/seat, often with harder metal alloys, is best for very close throttling, when media temperature is beyond the range of TFE (500°F) or when abrasive flow is involved. Iron globe valves most commonly use semi-plug bronze disc/seat design.
- 3) Automatic steam stop-check angle-globe valves are best on medium-pressure steam service where the sliding action of the semi-plug disc assembly permits the valve to serve as a shut-off valve, a throttling valve and a check valve.

Quarter-Turn Valve Design Detail (1)

a) Ball Valves

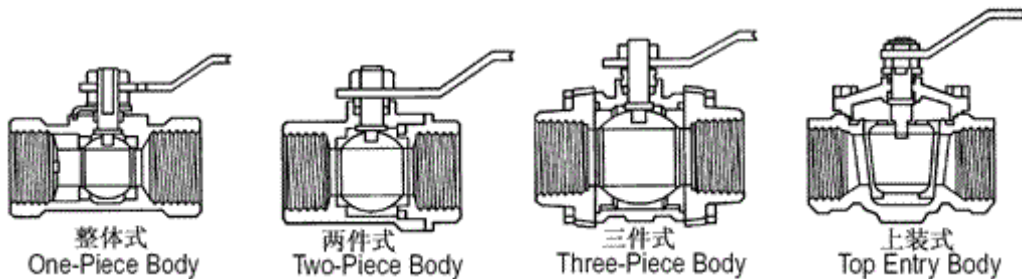
Positive Features - Recommendations

- 1) Bubble-tight shut-off from resilient (TFE) seats
- 2) Quick 90° open/close, not torque-dependent for seating
- 3) Straight-through unobstructed flow, bidirectional
- 4) Minimal pressure drop if full-port selected
- 5) Can be throttled (Application dependent)
- 6) Easier to automate than multi-turn valves
- 7) More compact than multi-turn valves
- 8) Offers high cycle life

Disadvantages

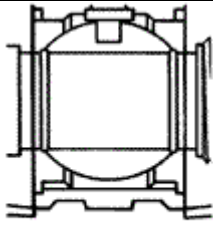
- 1) Temperature range limited by seat material

Body Styles

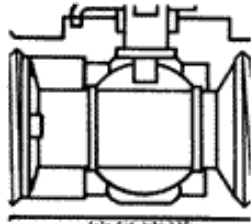


- 1) One-piece has no potential body leak path, but requires use of reduced port ball; thus, significant pressure drop. Not repairable.
- 2) Two-piece end entry is most common in building services. Best price value. Available full or standard-port balls. Not recommended to be repaired.
- 3) Three-piece is more costly, but is easier to disassemble and offers in-line reparability. Available in full or standard-port balls.
- 4) Top entry is preferred in some industrial applications where access for repair is required without removing body from the line. More costly than two-piece style.

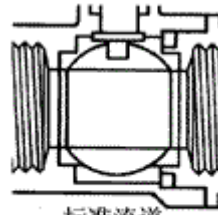
Port Size



Full-Port
不缩径全流道



缩径流道
Reduced Port

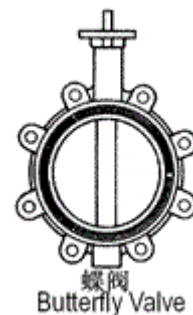


标准流道
Standard Port

- 1) Full-Port ball valves provide pressure drop equal to equivalent length of pipe, and even slightly better than gate valves.
- 2) Standard (conventional) port balls are up to one pipe size smaller than nominal pipe size, but still have significantly better flow than globe valves.
- 3) Reduced port ball valves have more than one pipe size flow restriction and are not recommended in building services piping, but rather for process piping in hazardous material transfer.

Quarter-Turn Valve Design Detail (2)

b) Butterfly Valves - Resilient Seated



Positive Features - Recommendations

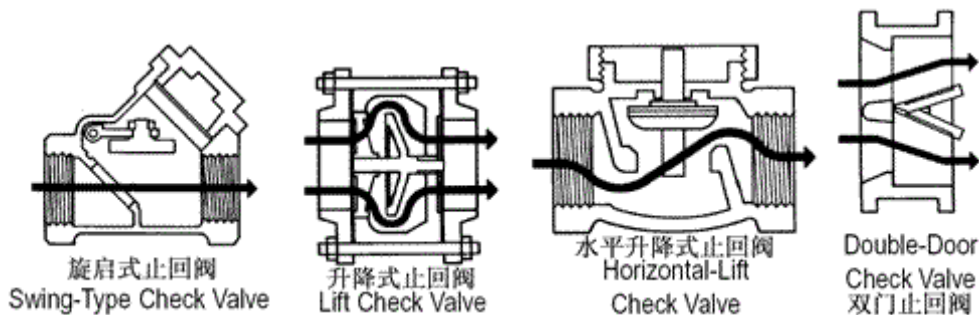
- 1) Bubble-tight shut-off from resilient seats
- 2) Quick 90° open/close, easier to automate than multi-turn valves
- 3) Very cost-effective compared to alternate valve choices
- 4) Broad range of throttling capabilities
- 5) Nearly full flow, less pressure drop than globe valves
- 6) Broad selection of trim materials to match different fluid conditions
- 7) More compact than multi-turn valves
- 8) Offers high cycle life

Disadvantages

- 1) Not for use with steam
- 2) Gear operators needed larger than 6" to aid in operation and protect against operating too quickly and causing destructive line shock.
- 3) Grooved butterfly valves direct connect to pipe using iron pipe size couplings. Grooved valves are easiest to install.
- 4) Flanged butterfly valves face to face dimension conforms to ANSI Standard B16.10 and Materials Class 125 and 150 ball, gate and plug valves.

Check Valve (Backflow Prevention) Design Detail Circuit Balancing Valve Design Detail

Check Valves (Backflow Prevention)



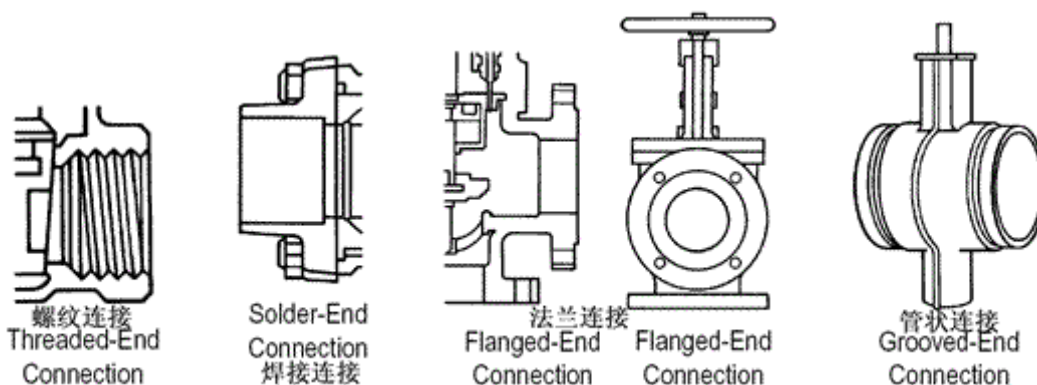
- a) Swing-type check offer the least pressure drop and offer simple automatic closure; when fluid flow stops, gravity and flow reversal closes valve. Many bronze valves offer a Y-pattern body with an angle seat for improved performance. Resilient seating preferred for tighter shutoff.
- b) Lift checks come in in-line or globe-style body patterns. Both cause greater pressure drop than the swing type, with the horizontal pattern similar in restriction to globe valves. Some styles are spring-actuated for immediate closure when flow stops. The in-line spring-actuated lift check also is referred to as the “silent check” because the spring closes the valve before gravity and fluid reversal can slam the valve closed. Resilient seating recommended.
- c) Double-door checks have twin discs on a spring-loaded center shaft. These valves have better flow than lift checks and most often use a wafer body for low cost and easy installation. Resilient seating recommended.

Circuit Balancing Valves



a) A Balancing Valve is used to regulate and measure the rate of flow of water. The valve can positively isolate the flow and be set at an intermediate position to maintain the design flow rate. Pressure tapping points on either side of the seat provide the means for flow measurement. Most Balancing Valves are globe style and incorporate a parabolic (plug) shaped disc.

End Connection



a) Threaded-end multi-turn valves, check valves and ball valves with ANSI female taper threads are most commonly used with pipe up to 2 1/2" or 3".

b) Solder-end valves permit directly connecting bronze multi-turn valves, check valves and ball valves up to 3" to copper tubing. Care must be taken not to overheat and damage valves during the soldering process.

c) Flanged-end connections are the most common used design for installation of iron multi-turn valves 2" and larger.

d) Wafer and lug body styles are used with butterfly valves and lift/double-door check valves for quick, easy installation between two flanges.

e) Grooved end ball, butterfly and check valves permit the quickest installation sizes 2" and larger.

HOT AND COLD DOMESTIC WATER SERVICE SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

BALL VALVES:

Valves shall be rated 150 psi SWP and 600 psi no shock CWP and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS-SP110.

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops which are full adjustable after insulation is applied shall be included.

GATE VALVES:

Rising Stem: Valves shall be Class 125 and 200 psi CWP, rising stem, union bonnet, solid wedge and manufactured in accordance with MSS-SP 80. Body, bonnet and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing and malleable or ductile iron hand wheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder-type.

Non-Rising Stem: Valves shall be Class 125 and 200 psi CWP, no rising stem, screw-in bonnet, solid wedge and manufactured in accordance with MSS-SP 80. Body, bonnet, external stuffing box and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, no asbestos packing and malleable or ductile iron hand wheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves

of like construction will be used. Valve ends may be threaded or solder-type
Valves shall be Class 125 and manufactured in accordance with MSS-SP 80; body and bonnet are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing, TFE seat disc and malleable or ductile iron hand wheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

LINE CONTROL VALVES 2 1/2" AND LARGER

BUTTERFLY VALVES:

Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS-SP67; 2" - 12" rated at least 200 psi non-shock cold water working pressure, 14" and larger rated at 150 psi. Body has to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 1/2"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer or dead-end service at full pressure without the need for downstream flanges.

GATE, GLOBE/ANGLE VALVES:

Valves to be Class 125 manufactured in accordance with MSS-SP70 (gate) or MSS-SP85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A 126 class B cast iron. Packing and gaskets are non-asbestos.

CHECK VALVES:

2 1/2" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder-type.

2 1/2" and larger shall be swing-type manufactured in accordance with MSS-SP71, Class 125, flanged ASTM A 126 Class B cast iron body with bronze trim, non-asbestos gasket. Or wafer-style with stainless steel spring, bronze disc plates, rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges. Spring-actuated valve is used on pump discharge.

Swing check with outside lever and spring to be used on sump, sewage and storm drain lines.

CIRCUIT BALANCING VALVES:

Circuit Balancing Valves 1/2" to 2" for domestic hot water service shall be NIBCO Globe Style, Series 1710. Valve shall have integral metering/test ports for flow balancing and flow measurement. Test ports shall have internal check valve and be equipped with caps. Valves shall be manufactured from dezincification resistant brass or bronze rated 240 psi at 250°F. All balancing valves shall have position indication readout and built in memory stop for repeatable regulation and control.

CONDENSER AND CHILLED WATER SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

BALL VALVES:

Valves shall be rated 150 psi SWP and 600 psi non-shock CWP and will have 2-pc. Cast bronze bodies, TFE seats, standard port, and separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS-SP110

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

GATE VALVES:

Valves shall be Class 125 rising stem, union bonnet, and solid wedge and manufactured in accordance with MSS-SP80. Body, bonnet and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing and malleable or ductile iron hand wheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

GLOBE/ANGLE VALVES:

Valves shall be Class 125 and manufactured in accordance with MSS-SP80, body and bonnet are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing, TFE seat disc and malleable or ductile iron hand wheel. Where higher operating pressures approach 150 psi, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

CHECK VALVES:

2 1/2" and smaller shall be Y-pattern swing type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder type.

LINE CONTROL VALVES 2 1/2" AND LARGER**BUTTERFLY VALVES:**

Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS-SP67; 2"-12" rated at least 200 psi non-shock cold water working pressure, 14" and larger rated at 150 psi. Body has 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 1/2"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges.

GATE, GLOBE/ANGLE VALVES:

Valves to be Class 125 manufactured in accordance with MSS-SP70 (gate) or MSS-SP85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A 126 Class B cast iron. Packing and gaskets are to be non-asbestos.

CHECK VALVES:

2 1/2" and larger shall be swing-type manufactured in accordance with MSS-SP71, Class 125, flanged ASTM A 126 Class B cast iron body with bronze trim, non-asbestos gasket. Or wafer-style with stainless steel spring, bronze disc plates, rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges. Spring-actuated valve is to be used on pump discharge. Swing check with outside lever and spring to be used on sump, sewage and storm drain lines.

CIRCUIT BALANCING VALVES:

Valves for heating and chilled water service shall be based on NIBCO Figure 1710, 1/2" to 2" and NIBCO Figure 737 2" to 12". 1/2" to 2" valves shall be constructed of dezincification resistant brass or bronze alloy. 2" to 12" valves will be constructed of iron with ANSI Class 125/150 flanged or grooved ends. All valves shall be globe style for precise regulation and control and rated 175 psi for Iron and 240psi for Bronze at 250°F. Each valve shall have two metering/test ports with internal check valve and protective caps. All valves must be equipped with visual position readout and memory stop for repeatable regulation and control.

HOT WATER HEATING SERVICE SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

BALL VALVES:

Valves shall be rated 150 psi SWP and 600 psi non-shock CWP and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS-SP110

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

GATE VALVES:

Valves shall be Class 125 rising stem, union bonnet, and solid wedge and manufactured in accordance with MSS-SP80. Body, bonnet and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing and malleable or ductile iron hand wheel. Valve ends may be threaded or solder type.

GLOBE/ANGLE VALVES:

Valves shall be Class 125 and manufactured in accordance with MSS-SP80, body and bonnet are to be of bronze ASTM B 62. Stems shall be of dezincification resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing, TFE seat disc and malleable or ductile iron hand wheel

LINE CONTROL VALVES 2 1/2" AND LARGER

BUTTERFLY VALVES:

<http://www.eninevalve.com>

E-mail: info@eninevalve.com

Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS-SP67; 2"-12" rated at least 200 psi non-shock cold water working pressure, 14" and larger rated at 150 psi. Body is to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 1/2"-6" shall be lever operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer or dead-end service at full pressure without the need for downstream flanges.

GATE, GLOBE/ANGLE VALVES:

Valves to be Class 125 manufactured in accordance with MSS-SP70 (gate) or MSS-SP85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A 126 Class B cast iron. Packing and gaskets are to be non-asbestos.

CHECK VALVES:

2 1/2" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc.

2 1/2" and larger shall be swing-type manufactured in accordance with MSS-SP71, Class 125, flanged ASTM A 126 Class B cast iron body with bronze trim, non-asbestos gasket. Or wafer-style with stainless steel spring, bronze disc plates, rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges.

LOW PRESSURE STEAM SERVICE (15 psi) SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

BALL VALVES:

Valves shall be rated 150 psi SWP and 600 psi non-shock CWP and will have 2-pc. Cast bronze bodies, TFE seats, standard port, and separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS-SP110

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

GATE VALVES:

Valves shall be Class 125 rising stem, union bonnet, and solid wedge and manufactured in accordance with MSS-SP80. Body, bonnet and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing and malleable or ductile iron hand wheel. Valve ends may be threaded or solder type.

GLOBE/ANGLE VALVES:

Valves shall be Class 125 and manufactured in accordance with MSS-SP80, body and bonnet are to be of bronze ASTM B 62. Stems shall be of dezincification resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing, TFE seat disc and malleable or ductile iron hand wheel

LINE CONTROL VALVES 2 1/2" AND LARGER

GATE, GLOBE/ANGLE VALVES:

Valves to be Class 125 manufactured in accordance with MSS-SP70 (gate) or MSS-SP85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A 126 Class B cast iron. Packing and gaskets are to be non-asbestos.

CHECK VALVES:

2 1/2" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc.

2 1/2" and larger shall be swing-type manufactured in accordance with MSS-SP71, Class 125, flanged ASTM A 126 Class B cast iron body with bronze trim, non-asbestos gasket. Or wafer-style with stainless steel spring, bronze disc plates, rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges.

MEDIUM-PRESSURE STEAM SERVICE (15-125 psi) SPECIFICATIONS**LINE CONTROL VALVES 2 1/2" AND SMALLER****BALL VALVES:**

Valves shall be rated 150 psi SWP and 600 psi non-shock CWP and will have 2-pc. Cast bronze bodies, TFE seats, standard port, and separate pack nut with adjustable stem packing, anti-blowout stainless steel stems and stainless steel vented ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads and be manufactured to comply with MSS-SP110

GATE VALVES:

Valves shall be threaded Class 125 rising stem, union bonnet, solid wedge and manufactured in accordance with MSS-SP80. Body, bonnet and wedge are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing and malleable or ductile iron hand wheel. Where steam working pressures approach 100 psi, Class 150 union bonnet valves of like construction will be used.

GLOBE/ANGLE VALVES:

Valves shall be threaded Class 125 and manufactured in accordance with MSS-SP80; body and bonnet are to be of bronze ASTM B 62. Stems shall be of dezincification-resistant silicon bronze ASTM B 371 or low-zinc alloy B 99, non-asbestos packing, TFE seat disc and malleable or ductile iron hand wheel. Where steam working pressures approach 100 psi, Class 150 union bonnet valves of like construction will be used. For close throttling or boiler blow-down use, valves shall have full plug stainless steel seat/disc.

LINE CONTROL VALVES 2 1/2" AND LARGER**GATE, GLOBE/ANGLE VALVES:**

Valves to be Class 125 manufactured in accordance with MSS-SP70 (gate) or MSS-SP85 (globe/angle), flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A 126 Class B cast iron. Packing and gaskets are to be no asbestos. Where steam working pressures exceed 100 psi, Class 250 valves of like construction shall be used.

CHECK VALVES:

2 1/2" and smaller shall be threaded Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc. Where steam working pressures approach 100 psi, Class 150 valves of like construction shall be used.

2 1/2" and larger shall be swing-type manufactured in accordance with MSS-SP71, Class 125, flanged ASTM A 126 Class B cast iron body with bronze trim, non-asbestos gasket. Where steam working pressures approach 100 psi, Class 250 valves of like construction shall be used.

STOP CHECK VALVES:

2 1/2" and larger Class 250 angle-globe style stop check valves may be used on boilers in lieu of globe or angle style control valves and swing check valves. Flanged body and bonnet are to be manufactured from ASTM A 126 Class B cast iron with bronze trim and non-asbestos gaskets. Sizing of stop check is to be in accordance with manufacturer's recommendations.

FIRE SPRINKLER AND FIRE PROTECTION SYSTEM SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

GATE VALVES:

Shall have approval rating 175 psi WWP or greater with body and bonnet made from cast bronze alloy ASTM B 62. Valve to be of OS&Y design with threaded ends. Valve to be Underwriters Laboratories® listed, Factory Mutual Approved and in compliance with MSS-SP80.

BALL VALVES:

Shall have approval rating 175 psi WWP or greater with TFE seats. Valve to have weatherproof gear operator rated for indoor/outdoor use with raised position indicator and two internal supervisory switches. Valves shall have threaded or I.P.S. grooved ends and will be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS-SP110

LINE CONTROL VALVES 2 1/2" AND LARGER

GATE VALVES:

Shall have approval rating of 175 psi WWP or greater, iron body with bronze trim or with resilient rubber encapsulated wedge. Body and bonnet to be of either cast iron alloy ASTM A 126 Class B or ductile iron ASTM A 536 with OS&Y type bonnet. If is of resilient wedge design, interior of valve to be epoxy-coated. Valve stem is to be pre-grooved for use with supervisory switch, if required. Ends to be flanged Class 125 or grooved. Valves to be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS-SP70.

INDICATOR POSTS WITH GATE VALVES:

Sizes 4" and larger shall have approval rating of 175 psi WWP or greater with bronze trim or with resilient rubber encapsulated wedge. Body and bonnet are to be of either cast iron alloy ASTM A 126 Class B or ductile iron ASTM A 536 with bonnet, incorporating indicator post mounting flange. If it is resilient wedge design, interior of valve is to be epoxy-coated. Ends to be flanged Class 125 or mechanical joint. Upright indicator post to be adjustable for bury depth required. Valves and posts to be Underwriters Laboratories listed and Factory Mutual Approved. Where applicable, valves to be in compliance with MSS-SP70

CHECK VALVES:

Shall have approval rating of 175 psi WWP or greater with bronze trim and rubber to metal seating. Body to be of cast iron alloy ASTM A 126 Class B. Ends to be flanged or wafer for use with Class

125/150 flanges. Valves to be Underwriters Laboratories listed, Factory Mutual Approved and, where applicable, in compliance with MSS-SP71.

BUTTERFLY VALVES:

Shall have approval rating of 175 psi WWP or greater. Valve to have weatherproof gear operator rated for indoor/outdoor use with hand wheel and raised position indicator and two internal supervisory switches. Bodies to be from cast ductile iron ASTM A 395 or A 536 and stems to be 400 series stainless steel. Valves shall be wafer style for installation between Class 125/150 flanges or I.P.S. grooved. Valves to be Underwriters Laboratories listed, Factory Mutual Approved and in compliance with MSS-SP67.

HI-RISE SERVICE GATE VALVES:

Shall have approval rating of 300 psi WWP or greater. OS&Y bonnet and body to be of cast iron alloy ASTM A 126 Class B. Valves to be flanged ends for use with Class 250/300 flanges. Valves to be Underwriters Laboratories listed, Factory Mutual approved and in compliance with MSS-SP70.

HI-RISE SERVICE GATE VALVES:

Shall have approval rating of 300 psi WWP or greater. Valves to be of the horizontal swing check design with bronze trim and body made from cast iron alloy ASTM A 126 Class B. Valves to be flanged ends for use with Class 250/300 flanges. Valves are to be approved by the New York City Materials and Equipment Acceptance (M.E.A.) Division and in compliance with MSS-SP71.

TRIM AND DRAIN VALVES 2 1/2" AND LARGER

BALL VALVES:

In order to have approval rating of 175 psi WWP or greater, valve is to have TFE seats, threaded ends, blowout-proof stem and lever handle. Valve to be Underwriters Laboratories listed and Factory Mutual Approved for trim and drain service and in compliance with MSS-SP-110.

GLOBE/ANGLE VALVES:

In order to have approval rating of 175 psi WWP or greater, valve is to have rubber seat disc and threaded ends. Valves to be Underwriters Laboratories listed for trim and drain service.

CHECK VALVES:

In order to have approval rating of 175 psi WWP or greater, valve is to have rubber seat discs and threaded ends. Valve is to be Y-pattern horizontal swing-type. Valve shall be in compliance with MSS-SP80.

COMPRESSED AIR SPECIFICATIONS

LINE CONTROL VALVES 2 1/2" AND SMALLER

BALL VALVES:

Valves shall be rated 600 psi cold working pressure and will have 2-pc. Cast bronze bodies, TFE seats, standard port, and separate pack nut with adjustable stem packing, ant blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads and be manufactured to comply with MSS-SP110. Where applicable for isolation, valves to be in compliance with OSHA Lockout/Tag out Standard 1910-147 and shall be designed to vent air to atmosphere upon closure. Valves shall be fitted with locking device so valves can be locked in open or closed position.

CHECK VALVES:

(NOTE: If air compressor is reciprocating type, Check Valves shall be downstream of receiver tank.)

2 1/2" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc or spring-loaded lift-type with resilient seating. Valve ends to be threaded-type.

LINE CONTROL VALVES 2 1/2" AND LARGER

BUTTERFLY VALVES:

Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS-SP67; 2"-12" rated at least 200 psi non-shock cold water working pressure, 14" and larger rated at 150 psi. Body is to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve is to have plated ductile iron or aluminum bronze alloy disc with Buna-N rubber seat and seals; or Buna-N rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 1/2"-6" shall be lever-operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges. Lever-operated valves shall be designed to be locked in the open or closed position.

CHECK VALVES:

(NOTE: If air compressor is reciprocating type, Check Valves shall be downstream of receiver tank.)

2 1/2" and larger shall be wafer-style with stainless steel spring, bronze disc plates, Buna-N rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges.

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ENINE PUMP VALVE



VACUUM SERVICE SPECIFICATIONS**LINE CONTROL VALVES 2 1/2" AND SMALLER****BALL VALVES:**

Valves shall be rated 600 psi non-shock cold working pressure and will have 2-pc. cast bronze bodies, TFE seats, standard port, separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Where pressure drop is a concern, full-port ball valves of like construction are to be used. Valve ends shall have full depth ANSI threads or extended solder connections and manufactured to comply with MSS-SP110.

CHECK VALVES:

2 1/2" and smaller shall be Y-pattern swing-type manufactured in accordance with MSS-SP80, Class 125, bronze ASTM B 62 body with TFE seat disc or spring-actuated lift-type with resilient seating. Valve ends may be threaded or solder-type

LINE CONTROL VALVES 2 1/2" AND LARGER**BUTTERFLY VALVES:**

Valves shall be lug or I.P.S. grooved body style manufactured in accordance with MSS-SP67; 2"-12" rated at least 200 psi non-shock cold water working pressure, 14" and larger rated at 150 psi. Body is to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve is to have plated ductile iron or aluminum bronze alloy disc with Buna-N rubber seat and seals; or Buna-N rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 1/2"-6" shall be lever-operated with 10-position throttling plate; sizes 8" and larger shall have gear operators. Lug-style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges. Lever-operated valves shall be designed to be locked in the open or closed position.

CHECK VALVES:

2 1/2" and larger shall be wafer-style with stainless steel spring, bronze disc plates, rubber seat, body of cast iron ASTM A 126 Class B or A 48 for use with Class 125/150 flanges.

MEDICAL GAS SERVICE SPECIFICATIONS

QUARTER-TURN BRONZE BALL VALVES:

Manufactured in compliance with MSS-SP-110 and rated 600 psi non-shock cold working pressure are to be used. Body shall have solder ends and 3-pc. Design is permitted disassembly for brazing installation. Valve to have TFE seats, full-port, anti-blowout stems and chrome-plated brass/bronze ball. Valve shall be provided by manufacturer cleaned and bagged for oxygen service.

NOTE: Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also, provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.